

FIGURE 1

(2) The open circuit output voltage (M-3): Not less than 90% of the OE breaker point assembly at any measured rpm.

e. Repeat step c above at  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ ) and  $100^{\circ}\text{C}$  ( $212^{\circ}\text{F}$ ).

f. The breaker points shall operate without evidence of point bounce at all test speeds and temperatures and shall operate easily without binding when operated manually.

#### 2. Durability Procedures

a. Set up a bench ignition system using an applicable distributor or electro-mechanical equivalent.

b. Install the breaker point assembly under test in the distributor, lubricate and adjust per applicable vehicle manufacturer's specifications. Use applicable coil, primary resistor, capacitor, cap and rotor.

c. Connect the primary of the test system with a power supply regulated at  $14 \pm 0.5$  V DC for a 12V system.

d. The secondary portion of the test system is to be connected to a  $12 \pm 2$  KV spark gap.

e. An external heat source shall generate an ambient temperature of  $70^{\circ}$  ( $158^{\circ}\text{F}$ ) for the distributor.

f. Drive the distributor at  $1750 \pm 50$  rpm for 200 hours. After each 50 hour interval, run the distributor for 5 minutes with one open circuit spark gap instead of a 12KV gap.

g. The replacement breaker point assembly must have the capability of performing throughout the duration of the test without evidence of any failure resulting in loss of spark in the 12KV spark gap.

h. After the 200 hours repeat step 1.c. above. The open circuit output voltage must be at least 90% of that measured in 1.c.

#### F. CAPACITORS/CONDENSERS

##### 1. Test Procedures and Criteria

a. The electrostatic capacitance of the replacement condenser shall be within  $\pm 20\%$  of the value of the original part at  $20 \pm 3^\circ\text{C}$  ( $68 \pm 5^\circ\text{F}$ ). The capacitance is to be measured on a capacitance bridge having an accuracy of  $\pm 1\%$  at 1 KHz frequency.

b. Set up the test system in accordance with Figure 1. The condenser series resistance shall be such that the output voltage at 500 distributor rpm with the replacement condenser shall not be less than 90% of the output voltage (M-3) with the original equipment condenser.

c. The capacitor must be able to withstand a minimum test voltage of 500V DC for a minimum of 0.1 seconds without failure.

d. (1) Measure capacitance after 4 hours minimum soak at  $70^\circ$  ( $158^\circ\text{F}$ ).

(2) After one hour at room temperature, place capacitor at  $-18^\circ\text{C}$  ( $0^\circ\text{F}$ ) for 4 hours minimum and measure capacitance.

(3) Place capacitor at room temperature for 4 hours minimum and measure capacitance.

e. After thermal cycling, repeat 1.a. and b. The results must be within  $\pm 10$  percent of the initial measurements.

#### 2. Durability Procedure

a. Set up a bench ignition system using an applicable distributor or an electro-mechanical equivalent.

b. Install the capacitor under test in the distributor adjusted to applicable vehicle manufacturer's specifications. Use applicable coil, primary resistor, breaker points, cap and rotor.

c. Connect the primary of the test system with a power supply regulated at  $14 \pm 0.5\text{V}$  DC for 12V system.

d. The secondary portion of the test system is to be connected to a  $12 \pm 2\text{KV}$  spark gap.

e. An external heat source shall generate an ambient temperature of  $70^\circ\text{C}$  ( $158^\circ\text{F}$ ) for the distributor.

f. Drive the distributor at  $1750 \pm 50$  rpm for 200 hours. After each 50 hour interval, run the distributor for 5 minutes with one open circuit spark gap instead of a 12KV gap.

g. The replacement part must have the capability of performing throughout the duration of the test without evidence of any failure resulting in loss of spark in the 12KV spark gap.

h. After the 200 hours, the condenser shall be within 10 percent of the capacitance and voltage measured in 1.a. and b. respectively.

#### G. DISTRIBUTOR CAPS AND/OR ROTORS

##### 1. Test Procedures and Criteria

a. Set up test system in accordance with the circuit and equipment per Figure 1 with OE distributor cap and/or rotor. Connect the primary to a  $14 \pm 0.5\text{V}$  DC regulated power supply.

b. Record open circuit output voltage (M-3) at 300 and 500 distributor rpm and at inter-

vals of 500 distributor rpm up to the maximum speed of the intended application.

c. Insert the intended replacement part(s) in the system and repeat step b. above under identical test conditions.

d. Subject the intended replacement part to the following thermal sequence through five complete cycles:

1. 12 hours at  $-40^\circ\text{C}$  ( $-40^\circ\text{F}$ )
2. 2 hours at room temperature
3. 4 hours at  $100^\circ\text{C}$  ( $212^\circ\text{F}$ )
4. 2 hours at room temperature.

e. Repeat step b. above with the replacement part(s).

f. The output voltages measured with the replacement part(s) in the system must be at least 90% of the output voltage with the OE cap and/or rotor.

#### 2. Durability Procedures

a. Set up test system in accordance with circuit and equipment per Figure 1.

b. Install the cap and/or rotor under test in distributor, lubricate and adjust per applicable vehicle manufacturer's specifications. Use equivalent coil, primary resistor, breaker points and capacitor.

c. Connect the primary of the test system with a power supply regulated at  $14 \pm 0.5\text{V}$  D.C.

1. In breaker point operated systems, connect secondary to a  $12\text{KV} \pm 2\text{KV}$  gap.

2. In electronic ignition systems, connect secondary to a gap equivalent to at least 50% of peak open-circuit voltage.

d. An external heat source shall generate an ambient temperature of  $70^\circ$  ( $158^\circ\text{F}$ ) for the distributor.

e. Distributor shall be driven at  $1750 \pm 50$  rpm for 200 hours. After each 50 hours interval, run the distributor for 5 minutes with one open-circuit spark gap instead of a 12KV gap.

f. The replacement part(s) must have the capability of performing throughout the duration of the test without evidence of any failure resulting in loss of spark at the spark gap.

g. Repeat step 1.c. above. The open circuit output voltage must be at least 90% of that measured in step 1.c.

h. The replacement cap and/or rotor must be free of any visual cracks, arcing or melting.

#### H. SPARK PLUGS

##### 1. Test Procedures and Criteria

a. Heat rating: When comparatively rated in the SAE 17.6 Spark Plug Rating engine according to the SAE J549A Recommended Practice, the comparative average rating of at least five (5) replacement spark plugs shall be within 15 percent of the average IMEP of at least five (5) OE spark plugs.

b. Gap spacing: The electrode spark gap shall be equivalent or adjustable to the recommended gap for the original equipment spark plug.

c. Gap location: The electrode gap position in the chamber shall be the same as specified by the vehicle manufacturer.

d. Flashover: The spark plug terminal end, with the properly fitted connecting boot, shall not flash-over at peak anticipated voltage for the intended application when electrode gap is 15% larger than vehicle manufacturer's gap specifications.

#### I. INDUCTIVE SYSTEM COILS

##### 1. Test Procedures and Criteria

a. Set up the circuit in accordance with Figure 1. Operate the circuit by an applicable distributor or equivalent triggering device and applicable primary resistor with a 50 pf load at  $14.0 \pm 0.50$  volts DC input as applicable and stabilized at an ambient temperature of  $20^\circ\text{C} \pm 3^\circ\text{C}$  ( $68^\circ\text{F} \pm 5^\circ\text{F}$ ).

b. With the original equipment coil installed, record the predominant minimum peak voltage and rise time at 300 and 500 distributor rpm, and at 500 rpm intervals up to the maximum intended operating speed. The measurement is to be taken after 4 minutes operation at each speed.

c. Install the replacement coil to be tested and repeat step b. above.

d. The replacement coil shall have an open-circuit output voltage (M-3) at least 90% of the OE coil output voltage and a rise time not to exceed 110% of original equipment coil at each distributor test speed.

##### 2. Durability Procedure

a. Install the replacement ignition coil in the ignition system using the applicable rotor, cap, capacitor, breaker points, and primary resistor.

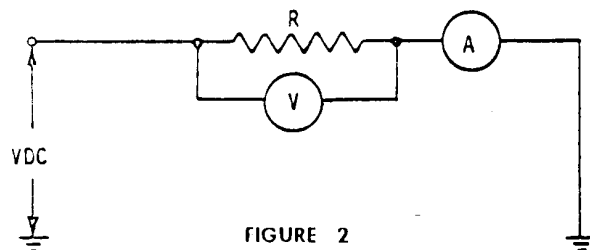


FIGURE 2

Current A to be maintained at 2.5 amps for duration of test.

b. Operate the circuit with a regulated power supply of  $14.0 \pm .5$  volts DC connected to the primary at an ambient temperature of  $70^\circ\text{C}$  ( $158^\circ\text{F}$ ) at  $1750 \pm 50$  distributor rpm for a duration of 200 hours. After each 50 hour interval, run the distributor for 5 minutes with one open-circuit spark gap instead of a 12KV gap.

c. The ignition coil shall perform throughout the test without any evidence of coil failure which would result in the loss of the spark in the 12 KV spark gap.

d. Repeat Step 1.c. above. The open-circuit output voltage must be at least 90% of that measured in 1.c.

#### J. PRIMARY RESISTORS

##### 1. Test Procedures and Criteria.

a. Configure the circuit shown in Figure 2, using the original equipment resistor.

b. At  $20 \pm 3^\circ\text{C}$  ( $68 \pm 5^\circ\text{F}$ ), apply voltage for 15 minutes; maintain current at 2.5 amps. At conclusion of 15 minutes, read voltage and

current. Calculate resistance using the relationship

$$R = E/I,$$

where:

R=Resistance in ohms,

E=Voltage (V) in volts,

I=Current (A) in amps.

c. Replace OE test sample with part to be certified and repeat step b. above.

d. Resistance of the part shall be within  $\pm 20\%$  of original equipment resistance.

##### 2. Durability Procedure.

a. Using the circuit shown in Figure 1, apply current at  $70^\circ\text{C}$  ( $150^\circ\text{F}$ ), for 200 hours.

b. After 200 hours retest as in step 1.c. above, and verify that resistance is within  $\pm 20\%$  of the value as measured in step 1.b. above.

#### K. DISTRIBUTORS—BREAKER POINT

##### 1. Test Procedures and Criteria.

a. Using an appropriate test installation, operate the distributor through its intended speed range.

b. The advance mechanism shall function within the tolerance of the vehicle manufacturer's original specification over the speed